We claim:

1. A process for removing
a compound which bears at least two functional groups which are each independently selected from the group consisting of nitrile group, carboxylic acid group, carboxylic ester group and carboxamide group,
from a mixture which comprises
a compound which bears at least two functional groups which are each independently selected from the group consisting of nitrile group, carboxylic acid group, carboxylic ester group and carboxamide group, and
a compound which is homogeneous with respect to the mixture and comprises rhodium, by distillation wherein the distillation is carried out at an average mean residence time in the range from 1 to 45 minutes.

2. The process according to claim 1, wherein the distillation is carried out at a temperature in the range from 50 to 200°C.

3. The process according to either of claims 1 and 2, wherein the compound used which bears at least two functional groups which are each independently selected from the group consisting of nitrile group, carboxylic acid group, carboxylic ester group and carboxamide group is a monoolefinically unsaturated compound.

4. The process according to claim 3, wherein the monoolefinically unsaturated compound used is a compound which is obtainable by dimerizing two terminal olefins which bear the functional groups required to prepare the monoolefinically unsaturated compound comprising at least two functional groups.

5. The process according to claim 4, wherein the terminal olefins used are two olefins which each independently have the formula $H_2C=CHR$ in which R is a nitrile group, carboxylic acid group, carboxylic ester group or carboxamide group.

6. The process according to either of claims 4 or 5, wherein the dimerization is carried out in the presence of a compound, as a catalyst, which is homogeneous with respect to the reaction mixture and comprises rhodium, ruthenium, palladium or nickel.

7. The process according to either of claims 4 or 5, wherein the dimerization is carried out in the presence of a compound, as a catalyst, which is homogeneous with respect to the reaction mixture and comprises rhodium.

8. The process according to any of claims 1 to 7, wherein the monoolefinically unsaturated compound used which bears at least two functional groups which are each independently selected from the group consisting of nitrile group, carboxylic acid group, carboxylic ester group and carboxamide group is hexenedioic diester.

9. The process according to any of claims 1 to 7, wherein the monoolefinically unsaturated compound used which bears at least two functional groups which are each independently selected from the group consisting of nitrile group, carboxylic acid group, carboxylic ester group and carboxamide group is butenedinitrile.

10. The process according to any of claims 1 to 7, wherein the monoolefinically unsaturated compound used which bears at least two functional groups which are each independently selected from the group consisting of nitrile group, carboxylic acid group, carboxylic ester group and carboxamide group is 5-cyanopentenoic ester.

11. The process according to either of claims 1 and 2, wherein the compound used which bears at least two functional groups which are each independently selected from the group consisting of nitrile group, carboxylic acid group, carboxylic ester group and carboxamide group is a saturated compound.

12. The process according to claim 11, wherein a saturated compound is used which is obtainable by hydrogenating a monoolefinically unsaturated compound which bears at least two functional groups which are each independently selected from the group consisting of nitrile group, carboxylic acid group, carboxylic ester group, carboxamide group, obtainable by a process according to any of claims 3-10.

13. The process according to claim 12, wherein the hydrogenation is carried out in the presence of a compound, as a catalyst, which is homogeneous with respect to the reaction mixture and comprises rhodium, ruthenium, palladium or nickel.

14. The process according to claim 12, wherein the hydrogenation is carried out in the presence of a compound, as a catalyst, which is homogeneous with respect to the reaction mixture and comprises rhodium.

15. The process according to any of claims 11 to 14, wherein the saturated compound used which bears at least two functional groups which are each independently selected from the group consisting of nitrile group, carboxylic acid group, carboxylic ester group and carboxamide group is adipic diester.

16. The process according to any of claims 11 to 14, wherein the saturated compound used which bears at least two functional groups which are each independently selected from the group consisting of nitrile group, carboxylic acid group, carboxylic ester group and carboxamide group is adipodinitrile.

17. The process according to any of claims 11 to 14, wherein the saturated compound used which bears at least two functional groups which are each independently selected from the group consisting of nitrile group, carboxylic acid group, carboxylic ester group and carboxamide group is 5-cyanovaleric ester.

18. The process according to either of claims 7 and 14, wherein the same rhodium-comprising compound is used as a catalyst in the hydrogenation and the dimerization.

19. The process according to any of claims 1 to 18, wherein the rhodium-comprising compound used which is homogeneous with respect to the mixture is of the formula $[L^1RhL^2L^3R]^+X^-$ where

- L^1 is an anionic pentahapto ligand;
- L^2 is an uncharged 2-electron donor;
- L^3 is an uncharged 2-electron donor;
- R is selected from the group consisting of H, C_1-C_{10}-alkyl, C_6-C_{10}-aryl and C_7-C_{10}-aralkyl ligands;
- X^- is an noncoordinating anion;

and where two or three of L^2, L^3 and R are joined if appropriate.

20. The process according to claim 19, wherein L^1 is pentamethylcyclopentadienyl.

21. The process according to either of claims 19 and 20, wherein X^- is selected from the group consisting of BF_4^-, $B(perfluorophenyl)_4^-$, $B(3,5\text{-}bis(trifluoromethyl)phenyl)_4^-$ and $Al(OR^F)_4^-$,
where R^F is identical or different part-fluorinated or perfluorinated aliphatic or aromatic radicals, in particular perfluoroisopropyl or perfluoro-tert-butyl.

22. The process according to any of claims 19 to 21, wherein L^2 and L^3 are each independently selected from the group consisting of C_2H_4, $CH_2=CHCO_2Me$, $P(OMe)_3$ and $MeO_2C-(C_4H_6)-CO_2Me$.

23. The process according to any of claims 19 to 21, wherein L^2 and L^3 together are selected from the group consisting of acrylonitrile and 5-cyanopentenoic ester.

24. The process according to any of claims 19 to 22, wherein L^2 and R together are $-CH_2-CH_2CO_2Me$.

25. The process according to any of claims 19 to 22 or 24, wherein L^2, L^3 and R together are $MeO_2C(CH_2)_2-(CH-)-(CH_2)CO_2Me$.

26. The process according to any of claims 19 to 25, wherein the rhodium-comprising compound which is homogeneous with respect to the mixture is selected from the group consisting of

$[Cp^*Rh(C_2H_4)_2H]^+ BF_4^-$,
$[Cp^*Rh(P(OMe)_3)(CH_2=CHCO_2Me)(Me)]^+ BF_4^-$,
$[Cp^*Rh(-CH_2-CH_2CO_2Me)(P(OMe)_3)]^+ BF_4^-$,
$[Cp^*Rh(MeO_2C(CH_2)2-(CH-)-(CH_2)CO_2Me)]^+ BF_4^-$,
$[Cp^*Rh(C_2H_4)_2H]^+ B(3,5\text{-bis(trifluoromethyl)phenyl})_4^-$,
$[Cp^*Rh(P(OMe)_3)(CH_2=CHCO_2Me)(Me)]^+ B(3,5\text{-bis(trifluoromethyl)phenyl})_4^-$,
$[Cp^*Rh(-CH_2-CH_2CO_2Me)(P(OMe)_3)]^+ B(3,5\text{-bis(trifluoromethyl)phenyl})_4^-$,
$[Cp^*Rh(MeO_2C(CH_2)2-(CH-)-(CH_2)CO_2Me)]^+ B(3,5\text{-bis(trifluoromethyl)phenyl})_4^-$,
$[Cp^*Rh(C_2H_4)_2H]^+ B(perfluorophenyl)_4^-$,
$[Cp^*Rh(P(OMe)_3)(CH_2=CHCO_2Me)(Me)]^+ B(perfluorophenyl)_4^-$,
$[Cp^*Rh(-CH_2-CH_2CO_2Me)(P(OMe)_3)]^+ B(perfluorophenyl)_4^-$,
$[Cp^*Rh(MeO_2C(CH_2)2-(CH-)-(CH_2)CO_2Me)]^+ B(perfluorophenyl)_4^-$,
$[Cp^*Rh(C_2H_4)_2H]^+ Al(OR^F)_4^-$,
$[Cp^*Rh(P(OMe)_3)(CH_2=CHCO_2Me)(Me)]^+ Al(OR^F)_4^-$,
$[Cp^*Rh(-CH_2-CH_2CO_2Me)(P(OMe)_3)]^+ Al(OR^F)_4^-$,
$[Cp^*Rh(MeO_2C(CH_2)2-(CH-)-(CH_2)CO_2Me)]^+ Al(OR^F)_4^-$,

where R^F is identical or different part-fluorinated or perfluorinated aliphatic or aromatic radicals, in particular perfluoroisopropyl or perfluoro-tert-butyl.

27. The process according to any of claims 1 to 26, wherein the distillation is carried out at a pressure in the range from 0.05 to 50 kPa.